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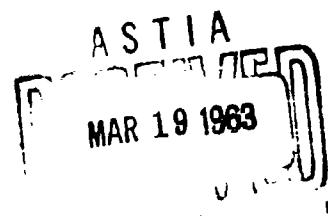
INCIDENCE AND PREVENTION OF ANTHRAX IN THE CISCAUCASIAN AND TRANSCAUCASIAN REPUBLICS

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INCIDENCE AND PREVENTION OF ANTHRAX IN THE CISCAUCASIAN
AND TRANSCAUCASIAN REPUBLICS

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A characteristic of the causative agent of anthrax that greatly complicates the control problem is that its spores remain viable in the soil for a long time. This is the main reason why the disease is so persistent in certain areas. For example, Novikov noted cases among cattle grazing on pastures where carcasses were buried 65 to 70 years ago, further confirming the fact that the spore forms of the causative agent in the soil remain virulent many years. Once an area is infected by anthrax microbes it is likely to remain a focus of the disease for a long time since the various control measures now used are not wholly effective.

Sporadic outbreaks among animals are recorded every year in the Ciscaucasian and Transcaucasian republics. In some years and in some regions the outbreaks assume epidemic proportions due to the existence of soil foci of the infection. For example, 578 foci were recorded in the Azerbaydzhan SSR during the past ten years, 136 in the Dagestan ASSR.

The anthrax rate among humans is directly related to the incidence of the disease among cattle (Fig. 1).

There are three kinds of anthrax -- agricultural-occupational, industrial-occupational, and domestic. Rudnev (1959) states that the agricultural-occupational kind prevails in the rural localities of the Soviet Union. This view is confirmed by the figures on the incidence of the disease among the urban and rural populations of the Ciscaucasian and Transcaucasian republics (Table 1).

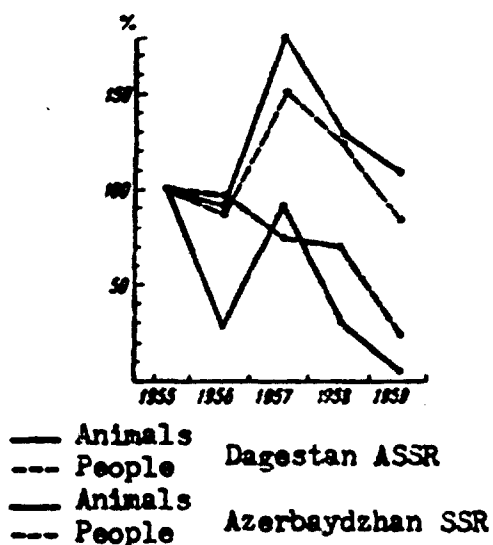


Fig. 1. Comparative Rate of Anthrax Among Animals and People in the Dagestan ASSR and Azerbaydzhan SSR by Years (as a % of 1955 figures)

that families of cattle handlers and owners make extensive use of sheepskins and goatskins in daily life. Children have many opportunities for contact with the source because the skins may come from diseased animals. Moreover, children are likely to have scratches and other skin defects that facilitate the entrance of the germs into the body.

There is no doubt that the cause of human infection in the majority of cases was contact with the source, specifically with sick animals. Most of the patients were directly engaged in agricultural work (Table 2) and many of them contracted the disease after secretly slaughtering cattle. According to our figures, sick and mandatorily slaughtered animals constituted 77.4% of the sources of infection in the Armenian SSR, 36% in the Georgian SSR, 28.7% in the Dagestan ASSR, and 11% in the Chechen-Ingush ASSR. Consequently, prohibition of clandestine slaughter of animals in stationary anthrax foci would be an effective control measure.

The infection of children (up to 15 years of age) -- as much as 11.5% in Dagestan, for example -- is noteworthy (Table 3). The reason is

TABLE 1

Comparative Rate of Anthrax Among Rural and Urban Populations (1950-1959)

| Republic | Incidence (as %) | |
|---------------------------|------------------|------------------|
| | Rural population | Urban population |
| Azerbaydzhan SSR | 94 | 6 |
| Georgian SSR | 93.4 | 6.4 |
| Armenian SSR | 96 | 4 |
| Dagestan ASSR | 68 | 32 |
| Chechen-Ingush ASSR | 97.8 | 2.2 |

TABLE 2

Occupational Breakdown of Anthrax Patients,
1950-1955 (as %)

| Patient's occupation | Republics | | | |
|--|-----------|----------|----------|--------------------|
| | Georgian | Armenian | Dagestan | Chechen- Ingush |
| a) Workers on collective and state farms handling animals | 90.3 | 85.4 | 62.3 | 68.8 |
| b) Workers in meat processing and tanning plants | 3 | 4 | 6.6 | 4.5 |
| c) Workers in hides, wool, and utility scraps ware- houses | 2.5 | 0.6 | -- | 2.2 |
| d) Veterinary technicians | 3.6 | -- | -- | 4.5 |

TABLE 3

Age Breakdown of Anthrax Patients

| Age (in years) | Rate (as %) of total number of patients in the republics | | | | |
|-------------------|---|----------|----------|----------|--------------------|
| | Azerbaijdzhan | Georgian | Armenian | Dagestan | Chechen- Ingush |
| Up to 5 | | | -- | 2.7 | 4.5 |
| 5-10 | 3 | 7 | 2 | 4.1 | 2.2 |
| 10-15 | | | 6 | 4.6 | 2.2 |
| 15-30 | 0.8 | 20 | 36.7 | 27 | 26.6 |
| 30-50 | 90 | 40 | 54.8 | 37.3 | 57 |
| 50 and older | 6 | 33 | 1.3 | 24 | 9 |

Mortality during the 10 years was 3.6 per 100 patients in Dagestan. Since specific drugs, including highly effective antibiotics, are available for treatment, the high death rate was presumably due to late hospitalization and delay in instituting treatment.

Noteworthy among the sources of human infection are hides, wool, and other contaminated animal products commercially processed. International and Soviet compilations of data on the incidence of anthrax among workers handling these raw materials, especially in countries that are major consumers of these products, are of interest. In the United States, for example, during the past 40 years the anthrax rate in the raw material processing industries had gradually risen by 1949 to 80% of

the total anthrax rate of the country (Shlyakhov, 1957; Makarov, 1960). In Russia occupational anthrax in 1916 constituted 31% of the total rate (Mikhlin, 1942). Cases are now recorded less frequently in the Soviet Union. According to the figures for 1955 and 1956, the rate among workers engaged in processing animal raw material did not exceed 0.5% of the total number of patients (Makarov, 1960) in certain republics (Uzbek, Moldavian, and Ukrainian SSR).

The proportion of the different groups of infections in the Ciscaucasian and Transcaucasian republics differs from the all-union figures in that the group of agricultural and nonoccupational infections in the aforementioned republics constituted 94% of the total number of patients as compared with 6% for the industrial-occupational group (Table 4).

TABLE 4.

Comparative Proportion (as %) of Different Groups of Anthrax Infections in the USSR and Ciscaucasian and Transcaucasian Republics

| Infection group | 1950-1959 | | |
|------------------------------|---------------|----------|---------------------|
| | Azerbaijdzhan | Dagestan | USSR (1955-1956) |
| Industrial-occupational | 6 | 9 | 0.5 |
| Agricultural-occupational .. | 94 | 77 | 82 |
| Nonoccupational | -- | 13.7 | 17 |

However, the incidence among industrial workers varies from region to region in the Soviet Union. For example, in the Moscow economic region, where the tanning industry is highly developed and where a great deal of animal raw material is naturally shipped in for processing, the industrial-occupational group of infections was 60% in a 15-year period while the agricultural-occupational group did not exceed 18% (Kolobkova, 1951). Thus, the proportion of infection groups in a given republic is influenced by the level of development of the raw material processing industries.

Judging by modern knowledge of the epizootology, epidemiology, clinical symptoms, and therapy of anthrax, control methods are fairly adequate. However, the persistence of the disease in the Caucasus and Transcaucasia shows the need of more education among the population.

Prevention of anthrax as a zoonotic infection depends on the efficiency of veterinary inspection of livestock raising farms and on carrying out specific prophylactic measures on those farms where

epizootic outbreaks once occurred. We must pay particular attention to the existing veterinary legislation. A special set of instructions deals with prophylactic measures, specifically the compulsory registration and compilation of detailed epizootological descriptions of foci with a full account of the actions taken every year. Systematic execution of special prophylactic veterinary measures in anthrax foci should be part of the duties of local health agencies, particularly the sanitary-epidemiological service. Attention should be centered on the foci, regardless of how old they are, i.e., no matter when the last case of the disease was recorded.

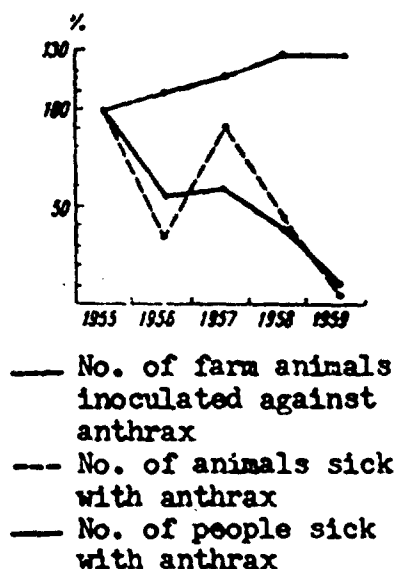


Fig. 2. Preventive inoculations of cattle and anthrax rate among animals and people by years (as % of 1955).

All cases among farm animals require early and accurate diagnosis, study of how they happened, and institution of quarantine measures. However, the reports and statistical materials of the sanitary-epidemiological stations have a large section devoted to patients who contracted the disease from unknown sources. During the past 5 to 10 years such patients constituted 14.6% of the total number of recorded cases in the Armenian SSR, 24.5% in the Dagestan ASSR, and 20% in the Chechen-Ingush ASSR.

Prophylactic vaccination should be one of the major veterinary-sanitary measures carried out in anthrax foci. Figures for 10 years in Dagestan testify to the great influence of preventive inoculations of cattle on the incidence of the disease both among animals and among people (Fig. 2). The systematic program of the veterinary agencies of Dagestan resulted in lowering the anthrax rate among animals in 1959 to 5% of the 1955 rate and to 10% among people. It is

fair to say that if preventive efforts during these years had been concentrated in the foci, the rate among people would have been much lower and total eradication of the disease would now be in sight.

We have mentioned the high effectiveness of veterinary-sanitary measures, particularly preventive inoculations of cattle in anthrax foci. However, these measures do not destroy the causative agent under natural conditions. Infected soil is known to remain infectious for many years. Old foci cannot be decontaminated without systematic execution of such measures as rendering pastures, barnyards, and inhabited

localities, sanitary, cleaning of reservoirs and animal watering places, sound preparation of cattle burial grounds, and collecting and appropriately burying the carcasses of dead animals. The scope of such a program will have to be adapted to the historic nature of the particular foci and to their current activity.

An important preventive step is to ban secret slaughtering of cattle (at home), a common practice in rural localities which helps to seed the causative agent in new areas and thus gives rise to epizooties and infection of people.

The local medical network and sanitary-epidemiological service should teach the people the rules and methods of personal hygiene when taking care of animals and urge them not to eat meat from mandatorily slaughtered animals with veterinary authorization or to sell the hides, wool, hair, etc., from such animals to state purchasing agencies without approval.

As for prophylactic vaccinations of the people in anthrax foci, the need for annual programs of this kind should be determined by the veterinary-prophylactic measures in force for livestock and by the scale of the efforts being made to decontaminate the soil foci (state of the veterinary service in a region, drainage of swampy pasture and hay fields, arrangement of reservoirs, wells, biothermal pits, and cattle burial grounds).

Matters relating to the clinical and laboratory diagnosis, treatment, and prevention of anthrax among people are quite fully described in the special instructions of the USSR Ministry of Health (Medgiz, 1959). Familiarity with these instructions and with the instructions on anthrax control among animals (Veterinary Legislation, Sel'khozgiz, 1959) would save field epidemiologists from many errors and shortcomings in their efforts to cope with the disease.

Preventive measures should be carried out in raw material processing plants, trading and purchasing agencies to protect the workers. Sanitary rules should be enforced from the time the raw material arrives. It is important to create the conditions that make it possible for the workers to observe the rules of personal hygiene while at work (Makarov, 1960).

The past failure to observe the rules for combatting anthrax, as Mikhin pointed out (1942), resulted in this infection spreading widely. The soil became contaminated by the carcasses of dead animals. Animals became infected by eating contaminated fodder and water and then transmitted the disease to man. The process was like a circular chain in which infected carcasses or sick animals were the main link. This chain can not be broken and then completely destroyed by efficient application

of measures based on experience and scientific principles. Anthrax is a disease which we have the knowledge and resources to eradicate.

FINDINGS

1. Anthrax among people in the Ciscaucasian and Transcaucasian republics arises chiefly among the rural population (94% of all cases) chiefly because they handle sick animals or slaughter them secretly.

2. Persons engaged in processing animal raw material showed a much lower rate of infection (6% of all cases), although the level is considerably above the all-union figure (0.5%).

3. There is a relatively high incidence among children (up to 15 years of age).

4. Incompleteness of the epidemiological investigation is apparently the reason for the large number of cases with unknown source of infection.

5. Even a single campaign of vaccinating cattle against anthrax substantially lowered the incidence among animals and man.

6. Methods of lowering the incidence of anthrax among people and decontamination measures are well known. Success is achieved by carefully recording the foci (regardless of how old they may be) and systematically carrying out veterinary-prophylactic measures -- annual vaccination of cattle, rigid control over secret slaughtering of sick animals and destruction of all carcasses of dead cattle, and absolute prohibition against dissecting animals dead of anthrax, removing the hide, or burying such carcasses.

7. The antiepidemic service of the region must keep an accurate record of all anthrax foci and be familiar with its geographical and epizootological features so that in cooperation with veterinary experts it can plan the steps needed to decontaminate the soil foci and execute routine protective measures among the people.

SUMMARY

Most cases (94%) of anthrax in the Ciscaucasian and Transcaucasian republics occur in rural localities as a result of handling or secretly slaughtering diseased animals. Eradication of anthrax is difficult because the spores of the causative agent remain viable in the soil for many years. Nevertheless, the incidence of the disease could be substantially reduced if well known prophylactic measures were systematically carried out.

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